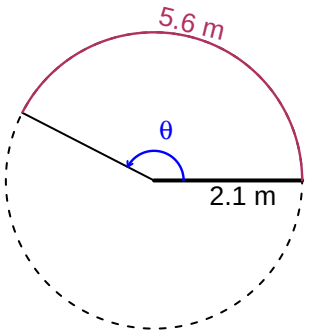
Name: Date:

Trig Final (SLTN v693)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 5.6 meters. The radius is 2.1 meters. What is the angle measure in radians?

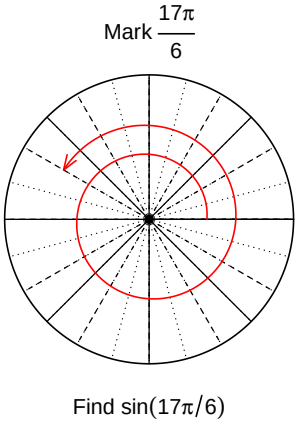


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

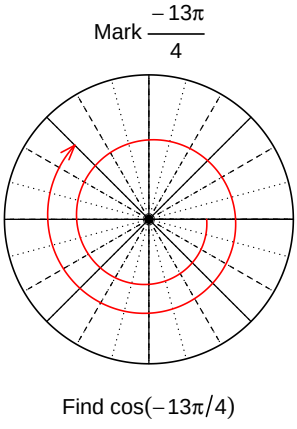
$\theta = 2.667$ radians.

Question 2

Consider angles $\frac{17\pi}{6}$ and $\frac{-13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{17\pi}{6}\right)$ and $\cos\left(\frac{-13\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(17\pi/6)$



Find $\cos(-13\pi/4)$

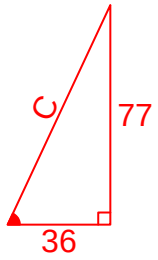
$\sin(17\pi/6) = \frac{1}{2}$

$\cos(-13\pi/4) = \frac{-\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{-77}{36}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

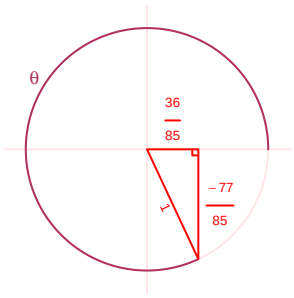
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$36^2 + 77^2 = C^2$$
$$C = \sqrt{36^2 + 77^2}$$
$$C = 85$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-77}{85}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -8.96$ meters, an amplitude of 3.68 meters, and a frequency of 6.72 Hz. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -3.68\sin(2\pi 6.72t) - 8.96$$

or

$$y = -3.68\sin(13.44\pi t) - 8.96$$

or

$$y = -3.68\sin(42.22t) - 8.96$$